Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (original): Method for estimating the seismic illumination fold | ($\bar{x}$, $\bar{p}$) in the migrated 3D domain at at least one image point $\bar{x}$, for at least one dip of vector $\bar{p}$,

Wherein the illumination fold I ($\bar{x}$,$\bar{p}$;$\bar{s}$,$\bar{r}$) for each (source $\bar{s}$, receiver $\bar{r}$) pair in the seismic survey is estimated, by applying the following steps:

- determination of the reflection travel time t_r ($\bar{x}_r$ ($\bar{p}$); $\bar{s}$, $\bar{r}$) from the source $\bar{s}$ to the specular reflection point $\bar{x}$, on the plane reflector passing through the image point $\bar{x}$ and perpendicular to the dip vector $\bar{p}$ and then returning to the reflector $\bar{r}$;

starting from the diffraction travel time t_d ($\bar{x}$; $\bar{s}$, $\bar{r}$) from the source $\bar{s}$ to the said image point x and then returning to the reflector $\bar{r}$;

- incrementing the said illumination fold I($\bar{x}$,$\bar{p}$;$\bar{s}$,$\bar{r}$) related to the said (source $\bar{s}$, receiver $\bar{r}$) pair as a function of the difference between the diffraction travel time t_d ($\bar{x}$;$\bar{s}$,$\bar{r}$) and the reflection travel time t_r ($\bar{x}_r$ ($\bar{p}$); $\bar{s}$, $\bar{r}$).

Claim 2 (original). Method according to claim 1, comprising the step of summating each of the said illumination folds I($\bar{x}$,$\bar{p}$;$\bar{s}$,$\bar{r}$) related to a (source $\bar{s}$, receiver $\bar{r}$) pair so as to determine the total illumination fold $I(\bar{x},\bar{p}) = \sum_{\bar{s}\,\bar{p}} I(\bar{x},\bar{p};\bar{s},\bar{r})$.

Claim 3 (currently amended): Method according to claim 1, ~~one of the preceding claims,~~ wherein, during the incrementing step, the illumination fold I ($\bar{x}$,$\bar{p}$,$\bar{s}$,$\bar{r}$) is incremented using an increment function I (t_d, t_r; $\bar{s}$,$\bar{r}$) according to $I(\bar{x},\bar{p}) = I(\bar{x},\bar{p}) + i\ (t_d, t_r; \bar{s},\bar{r})$, the said increment function taking account of the difference between the diffraction travel time t_d ($\bar{x}$; $\bar{s}$, $\bar{r}$) and the reflection travel time L_r ($\bar{x}_r$ ($\bar{p}$); $\bar{s}$, $\bar{r}$).

Claim 4 (original): Method according to claim 3, wherein the increment function i is a function of the seismic wavelet s(t).

Claim 5 (original): Method according to claim 4, wherein the increment function i is expressed as a function of the derivative of the seismic wavelet s(t) according to:

$$I\,(t_d,\ t_r; \bar{s}, \bar{r}) - s\,(t_d(\bar{x};\ \bar{s},\ \bar{r}) - t_r(\bar{x}_r(\bar{p}); \bar{s}, \bar{r})$$

Claim 6 (original): Method according to claim 4, wherein the increment function i is expressed as a function of the derivative $\bar{s}$ (t) of the seismic wavelet s (t) with respect to time according to:

$$i\,(t_d,\ t_r;\ \bar{s},\ \bar{r}) - s\,(t_d(\bar{x};\ \bar{s},\ \bar{r}) - L_r(\bar{x}_r(\bar{p});\bar{s},\bar{r}).$$

Claim 7 (original): Method according to claim 3, ~~any one of claims 3 to 6,~~ in which an a priori correction w $(\bar{x},\bar{s},\bar{r})$ of the illumination fold is taken into account by migration, comprising the step of incrementing the illumination fold I $(\bar{x}, \bar{p}; \bar{s}, \bar{r})$ related to a (source $\bar{s}$, receiver $\bar{r}$) pair by $i\,(t_d,\ t_r;\ \bar{s},\ \bar{r})\ .\ w\,(\bar{x};\ \bar{s},\ \bar{r})$.

Claim 8 (currently amended): Method according to claim 1, ~~any one of the preceding claims,~~ wherein the determination step includes the second order Taylor series development of the diffraction travel time (x; s, r) around the image point x:

$$t_d(\bar{x};\ \bar{s},\ \bar{r}) = t_d(\bar{x};\ \bar{s},\ \bar{r}) + (\bar{\nabla}_x t_d(\bar{x};\bar{s},\bar{r}))^T.(\bar{x}_r\text{-}\bar{x}) + \frac{1}{2}(\bar{x}_r - \bar{x})^T \cdot \Delta_{x,\,x} t_d(\bar{x};\bar{s},\bar{r}).(\bar{x}_r - \bar{x})$$

Claim 9 (original): Method according to claim 8, wherein the specular reflection point $\bar{x}_r$ $(\bar{p})$ is determined along the length of the said reflector such that the diffraction travel time at the said specular reflection point $\bar{x}_r$ $(\bar{p})$ is stationary, according to the equation:

$$\bar{p}^T \wedge (\bar{\nabla}_x t_d(\bar{x};\bar{s},\bar{r}) + \Delta_{x,\,x} t_d(\bar{x};\bar{s},\bar{r})\ .\ (\bar{x}_r(\bar{p}) - \bar{x})) = \bar{0}.$$

Claim 10 (currently amended): Method according to claim 8, ~~any one of claims 8 or 9,~~ wherein the specular reflection point $\bar{x}_r$ and the reflection travel time t_r $(\bar{x}_r(\bar{p});\ \bar{s},\ \bar{r})$ are determined according to the following expressions:

$$\bar{x}_r(\bar{p}) - \bar{x} - M\,.\,F^{-1}.\,\bar{b}$$

$$t_r(\bar{x}_r(\bar{p});\bar{s},\bar{r}) = t_d(\bar{x};\bar{s},\bar{r})\ -)_2\ .\bar{b}^r.\ F^{-1}.\bar{b}$$

where:

- M is a (3 x 2) matrix described by two vectors extending along the length of the reflector, and therefore perpendicular to the dip vector $\bar{p}$;

- $\bar{b}$ is a (2 x 1) vector of first order derivatives of the diffraction travel time along the reflection plane: $\bar{b} = M^T.(\bar{\nabla}_x t_d)$;

- F is a (2 x 2) matrix of second order derivatives of the diffraction travel time along the reflection plane: $F = M^T.(\Delta_{x,\,x} t_d).M$.

Claim 11 (original): Method according to claim 10, ~~any one of the preceding claims,~~ wherein the determination step uses isochronic migration maps t_d $(\bar{x};\ \bar{s},\ \bar{r})$ specified for each (source $\bar{s}$, receiver $\bar{r}$) pair involved in the migration at each image point $\bar{x}$ in the migrated 3D domain.

Claim 12 (original): Method according to claim 11, ~~any one of the preceding claims,~~ wherein the seismic illumination fold $I(\bar{x}, \bar{p})$ in the migrated 3D domain is estimated during the Kirchoff summation migration of seismic data recorded during the 3D seismic prospecting.

Claim 13 (currently amended): Method for correction of seismic data amplitudes recorded during 3D seismic prospecting in order to compensate for the effect of non-uniform illumination of sub soil reflectors, comprising the steps of:

- estimating the illumination fold $I(\bar{x}, \bar{p})$ using the method according to claim 1, ~~any one of claims 1 to 12~~,
- using the inverse $I^{-1}(\bar{x}, \bar{p})$ of the said ratio as a weighting factor to be applied to each of the said seismic data amplitudes.

Claim 14 (currently amended): Method for selection of an acquisition geometry among a plurality of acquisition geometries as a function of the target of 3D seismic prospecting, comprising the steps of:

- determining the illumination fold $I(\bar{x}, \bar{p})$ by the method according to claim 1, ~~any one of claims 1 to 12,~~ for each of the acquisition geometries considered,
- selecting the acquisition geometry providing the optimum illumination fold as a function of the target.

Claim 15 (new): Method according to claim 2, wherein, during the incrementing step, the illumination fold $I(\bar{x},\bar{p},\bar{s},\bar{r})$ is incremented using an increment function $i(t_d, t_r; \bar{s},\bar{r})$ according to $I(\bar{x},\bar{p}) = I(\bar{x},\bar{p}) + i(t_d, t_r; \bar{s},\bar{r})$, the said increment function taking account of the difference between the diffraction travel time $t_d(\bar{x}; \bar{s}, \bar{r})$ and the reflection travel time $t_r(\bar{x}_r(\bar{p}); \bar{s}, \bar{r})$.

Claim 16 (new): Method according to claim 15, in which an a priori correction $w(\bar{x},\bar{s},\bar{r})$ of the illumination fold is taken into account by migration, comprising the step of incrementing the illumination fold $I(\bar{x}, \bar{p}; \bar{s}, \bar{r})$ related to a (source $\bar{s}$, receiver $\bar{r}$) pair by $i(t_d, t_r; \bar{s}, \bar{r}) \cdot w(\bar{x}; \bar{s}, \bar{r})$.

Claim 17 (new): Method according to claim 16, wherein the determination step includes the second order Taylor series development of the diffraction travel time $(\bar{x}; \bar{s}, \bar{r})$ around the image point $\bar{x}$:

$$t_d(\bar{x}; \bar{s}, \bar{r}) = t_d(\bar{x}; \bar{s}, \bar{r}) + (\bar{\nabla}_x t_d(\bar{x}; \bar{s}, \bar{r}))^T . (\bar{x}_r - \bar{x}) + \frac{1}{2} (\bar{x}_r - \bar{x})^T \cdot \Delta_{x,x} t_d(\bar{x}; \bar{s}, \bar{r}) . (\bar{x}_r - \bar{x})$$

Claim 18 (new): Method according to claim 17, wherein the specular reflection point $\bar{x}_r$ $(\bar{p})$ is determined along the length of the said reflector such that the diffraction travel time at the said specular reflection point $\bar{x}_r$ $(\bar{p})$ is stationary, according to the equation:

$$\bar{p}^T \wedge (\bar{\nabla}_x t_d(\bar{x}; \bar{s}, \bar{r}) + \Delta_{x,x} t_d(\bar{x}; \bar{s}, \bar{r}) \cdot (\bar{x}_r(\bar{p}) - \bar{x})) = \bar{0}.$$

Claim 19 (new): Method according to claim 18, wherein the specular reflection point $\bar{x}_r$ and the reflection travel time t_r $(\bar{x}_r$ $(\bar{p})$; $\bar{s}, \bar{r})$ are determined according to the following expressions:

$$\bar{x}_r(\bar{p}) - \bar{x} - M \cdot F^{-1} \cdot \bar{b}$$

$$t_r(\bar{x}_r(\bar{p}); \bar{s}, \bar{r}) = t_d(\bar{x}; \bar{s}, \bar{r}) -)\frac{1}{2} \cdot \bar{b}^r \cdot F^{-1} \cdot \bar{b}$$

where:

- M is a (3 x 2) matrix described by two vectors extending along the length of the reflector, and therefore perpendicular to the dip vector $\bar{p}$;

- $\bar{b}$ is a (2 x 1) vector of first order derivatives of the diffraction travel time along the reflection plane: $\bar{b} = M^T \cdot (\bar{\nabla}_x t_d)$;

- F is a (2 x 2) matrix of second order derivatives of the diffraction travel time along the reflection plane: $F = M^T \cdot (\Delta_{x,x} t_d) \cdot M$.

Claim 20 (new): Method according to claim 19, wherein the determination step uses isochronic migration maps t_d $(\bar{x}; \bar{s}, \bar{r})$ specified for each (source $\bar{s}$, receiver $\bar{r}$) pair involved in the migration at each image point $\bar{x}$ in the migrated 3D domain.

Claim 21 (new): Method according to claim 20, wherein the seismic illumination fold I $(\bar{x}, \bar{p})$ in the migrated 3D domain is estimated during the Kirchoff summation migration of seismic data recorded during the 3D seismic prospecting.